

WHAT IS CLAIMED IS:

1. An erasable colored pencil lead composition comprising a colorant, one or more binder resins, a fibrillatable or fibrillated material, and a filler.

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2. The erasable colored pencil lead composition of claim 1, wherein said composition is substantially free of low melting waxes or wax-like materials.

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3. The erasable colored pencil lead composition of claim 2, wherein said low melting waxes or wax-like materials have a melting or softening point of about 90°C or below.

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4. The erasable colored pencil lead composition of claim 2, wherein said low melting waxes or wax-like materials have a needle penetration hardness value of 5 units or above.

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5. The erasable colored pencil lead composition of claim 2, wherein said binder resin is a polyolefin.

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6. The erasable colored pencil lead composition of claim 5, wherein said polyolefin is selected from the group consisting of polypropylene, high density polyethylene, low density polyethylene, high melting polyolefin waxes, and combinations thereof.

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7. The erasable colored pencil lead composition of claim 6, wherein said polyolefin is combination of a polypropylene, a low density polyethylene, and a high melting polyethylene wax.

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8. The erasable colored pencil lead composition of claim 1, wherein said fibrillatable or fibrillated material is a fibrillatable or fibrillated polymer.

9. The erasable colored pencil lead composition of claim 8, wherein said fibrillatable or fibrillated polymer is a fibrillatable or fibrillated copolymer.

5        10. The erasable colored pencil lead composition of claim 9, wherein said fibrillatable or fibrillated copolymer is a fibrillatable or fibrillated ethylene-vinyl acetate copolymer.

10       11. The erasable colored pencil lead composition of claim 1, further includes a lubricant.

15       12. The erasable colored pencil lead composition of claim 11, wherein said lubricant is a non-particulate lubricant.

20       13. The erasable colored pencil lead composition of claim 12, wherein said lubricant forms a separate domain from the binder resin.

25       14. The erasable colored pencil lead composition of claim 13, wherein said lubricant is a polar material.

30       15. The erasable colored pencil lead composition of claim 14, wherein said polar material is an alkoxyated material.

35       16. The erasable colored pencil lead composition of claim 15, wherein said alkoxyated material is selected from the group consisting of polyalkylene glycols, alkoxyated ethers, alkoxyated lanolin, alkoxyated lanolin alcohols, alkoxyates of mono- and polyhydric alcohols, alkoxyated fatty acids, alkoxyated vegetable oils, alkoxyated hydrogenated vegetable oils, and combinations thereof.

      17. The erasable colored pencil lead composition of claim 15, wherein said alkoxyated material is an ethoxyated material.

18. The erasable colored pencil lead composition of claim 17, wherein said ethoxylated material is selected from the group consisting of polyethylene glycols, ethoxylated ethers, ethoxylated lanolin, ethoxylated lanolin alcohols, ethoxylates of mono- and polyhydric alcohols, ethoxylated fatty acids, ethoxylated vegetable oils, ethoxylated hydrogenated vegetable oils, and combinations thereof.

19. The erasable colored pencil lead composition of claim 18, wherein said ethoxylated material is polyethylene glycol.

20. The erasable colored pencil lead composition of claim 1, wherein said composition includes an antioxidant.

21. The erasable colored pencil lead composition of claim 10, wherein said composition includes an antioxidant.

22. A method for using an erasable colored pencil lead composition on a surface to be marked, the method comprising:

- (a) providing an erasable colored pencil lead composition;
- (b) providing the surface; and
- (c) applying the lead to the surface to create a mark that forms a cohesive layer of said colored pencil lead composition.

23. The method of claim 22, wherein said lead composition comprises a colorant, one or more binder resins, a fibrillatable or fibrillated material, and a filler.

24. The method of claim 23, wherein said lead composition further includes a lubricant.

25. The method of claim 24, wherein said lubricant forms a separate domain from at least one of the binder resins.

5        26. The method of claim 25, wherein said at least one of the binder resins is a polyolefin.

27. The method of claim 24, wherein said lubricant is a polar material.

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28. The method of claim 27, wherein said polar material is an alkoxyated material.

29. The method of claim 28, wherein said alkoxyated material is selected from the group consisting of  
15 polyalkylene glycols, alkoxyated ethers, alkoxyated lanolin, alkoxyated lanolin alcohols, alkoxyates of mono- and polyhydric alcohols, alkoxyated fatty acids, alkoxyated vegetable oils, alkoxyated hydrogenated  
20 vegetable oils, and combinations thereof.

30. The method of claim 28, wherein said alkoxyated material is an ethoxyated material.

25        31. The method of claim 30, wherein said ethoxyated material is selected from the group consisting of polyethylene glycols, ethoxyated ethers, ethoxyated lanolin, ethoxyated lanolin alcohols, ethoxyates of mono- and polyhydric alcohols, ethoxyated fatty acids,  
30 ethoxyated vegetable oils, ethoxyated hydrogenated vegetable oils, and mixtures thereof.

32. The method of claim 31, wherein said ethoxyated material is polyethylene glycol.

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33. The method of claim 23, wherein said lead composition includes an antioxidant.

34. The method of claim 22, wherein said composition is substantially free of low melting waxes or wax-like materials.

5        35. The method of claim 22, further comprising erasing said mark using an ordinary pencil eraser.

36. The method of claim 23, wherein at least one of said binder resins is a polyolefin.

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37. The method of claim 28, wherein said fibrillatable or fibrillated material is a fibrillatable or fibrillated polymer.

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38. The method of claim 37, wherein said polymer is a fibrillatable or fibrillated copolymer.

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39. The method of claim 38, wherein said fibrillatable or fibrillated copolymer is a fibrillatable or fibrillated ethylene-vinyl acetate copolymer.

40. The method of claim 22, wherein said surface is a porous surface.

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41. The method of claim 40, wherein said porous surface is paper.

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42. A method of erasing a mark made by an erasable colored pencil lead composition on a surface, the method comprising applying an ordinary pencil eraser to said mark, wherein said mark forms a cohesive layer of a colored pencil lead composition comprising a colorant, one or more binder resins, a fibrillatable or fibrillated material, and a filler.

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43. The method of claim 42, wherein said erasable colored pencil lead composition is substantially free of low melting waxes or wax-like materials.

44. An erasable colored pencil lead composition comprising a colorant, one or more binder resins, a fibrillatable or fibrillated material, a non-fibrillatable particulate lubricant, and a filler.

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45. The erasable colored pencil lead composition of claim 44, wherein said fibrillatable or fibrillated material is a fibrillatable or fibrillated polymer.

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46. The erasable colored pencil lead composition of claim 45, wherein said non-fibrillatable particulate lubricant is a non-fibrillatable particulate polymer.

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47. The erasable colored pencil lead composition of claim 46, wherein said non-fibrillatable particulate polymer is polytetrafluoroethylene.

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48. The erasable colored pencil lead composition of claim 44, wherein said colorant is a pigment.

49. The erasable colored pencil lead composition of claim 48, wherein said fibrillatable or fibrillated polymer is polytetrafluoroethylene.

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50. The erasable colored pencil lead composition of claim 44, wherein at least one of said binder resins is selected from the group consisting of thermoplastic polymers, thermosetting polymers, and latex polymers.

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51. The erasable colored pencil lead composition of claim 50, wherein said binder resin is an thermoplastic polymer.

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52. The erasable colored pencil lead composition of claim 51, wherein said thermoplastic polymer is a polyolefin.

53. The erasable colored pencil lead composition of claim 52, wherein said composition includes an olefin homopolymer and an olefin copolymer as binder resins.

5 54. The erasable colored pencil lead composition of claim 53, wherein said olefin homopolymer is selected from the group consisting of polypropylene and high density polyethylene and said olefin copolymer is an ethylene-acrylic acid copolymer.

10 55. The erasable colored pencil lead composition of claim 44, wherein said non-fibrillatable polymer and said fibrillatable or fibrillated polymer are present in the composition in an amount of from about 1:0.01 to about 1:1.

15 56. The erasable colored pencil lead composition of claim 44, wherein said filler is selected from the group consisting of mica, talc, silica, clay, and calcium carbonate.

20 57. The erasable colored pencil lead composition of claim 45, wherein said colorant is present in an amount of from about 10% by volume to about 30% by volume of the composition, said binder resin or resins are present in an amount of from about 30% by volume to about 50% by volume of the composition, said fibrillatable or fibrillated polymer is present in an amount of from about 2% by volume to about 10% by volume, said non-fibrillatable particulate polymer is present in an amount of from about 10% by  
25 volume to about 30% by volume of the composition, and said filler is present in an amount of from about 10% by volume to about 30% by volume of the composition.

30 58. A process for preparing an erasable colored pencil lead comprising a colorant, one or more binder resins, a fibrillatable or fibrillated material, a non-fibrillatable particulate lubricant, and a filler, said process comprising blending said colorant, said binder resin or resins, said fibrillatable or fibrillated  
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material, said non-fibrillatable particulate lubricant, and said filler to obtain a blend and forming said pencil lead from said blend.

5           59. The process of claim 58, wherein said blending is carried out as a dry blending process, semi-dry blending process, or a wet blending process.

10           60. The process of claim 58, wherein said pencil lead is formed by processing the blend in a melt process, wet process, or reactive process.

15           61. The process of claim 58, wherein said fibrillatable or fibrillated material is a fibrillatable or fibrillated polymer.

20           62. The process of claim 58, wherein said non-fibrillatable particulate lubricant is a non-fibrillatable particulate polymer.

25           63. The process of claim 62, wherein said non-fibrillatable particulate polymer is polytetrafluoroethylene.

30           64. The process of claim 58, wherein said colored pencil lead includes an antioxidant.

35           65. The colored pencil lead composition of claim 44, wherein said lead composition is used to produce on a White Bond paper a first mark and said first mark is erased to produce a second mark, said second mark having a not erased rating of about 15% or less, wherein said first mark is produced on said paper under a constant applied force which is in the range of 300-600 g; and said first mark is erased using an ordinary pencil eraser under a constant applied force of 600 g.

          66. The colored pencil lead composition of claim 65, wherein said first mark is smeared by said erasing



resulting in a third mark, said third mark having an eraser smear rating of about 30% or less wherein the eraser was extended outside said first mark on the paper to a distance equal to the distance erased on said first mark to create  
5 said third mark.

67. The colored pencil lead composition of claim 65, wherein said first mark has a blending stump smudging rate of about 20% or less, wherein said stump was used to rub  
10 said first mark under a constant applied force of 1200 g and the stump was extended outside said first mark on the paper to a distance equal to the distance rubbed on the mark.

15 68. The erasable colored pencil lead composition of any of claims 1-22, 44-57, and 65-67, wherein said composition is capable of making a mark that forms a cohesive layer of the composition when applied to a surface.